to the mean value of about 3×10^{-6} gm/gm.hr. at 400°C. Samples trepanned from the moderator of operational reactors and specimens exposed in reactors have indicated that the reaction rate could increase by at least an order of magnitude after prolonged exposure to reactor conditions, and it is possible to correlate the increase with irradiation dose and with the weight loss which results from exposure to the reactor coolant. In other experimental work which is described the performance of chemicals as inhibitors of graphite oxidation has been investigated, and one, phosphorus oxychloride, shows promise of reducing the reaction rate by at least an order of magnitude if injected in small quantities at the time of an emergency.

The influence of some of the above factors on the course of events following the postulated accident is illustrated using calculated temperature - time curves for a reactor channel, and the methods of calculation are outlined. The effect of graphite oxidation on reactor temperatures is strongly dependent on the reaction rate which is assumed. The value for virgin material, 3×10^{-6} gm/gm.hr as measured at 400°C, has a negligible effect, although values very much greater than this could lead to rising graphite temperatures. The remedial measures provided for such an emergency include a massive CO_2 feed, and it is shown that this, combined with circulator flow at atmospheric pressure, would prevent damage to fuel and release of fission products following such an accident. Chemical inhibitors if used would provide a valuable additional safeguard.